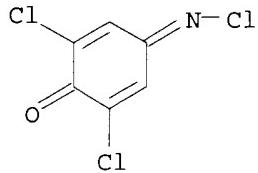


L1 ANSWER 6 OF 18 CA COPYRIGHT 2003 ACS
 AN 135:315308 CA
 TI Screening method for the discovery and directed evolution of oxygenase
 using a Gibbs assay
 IN Arnold, Frances F.; Joern, John; Sakamoto, Takeshi; **Schwaneberg, Ulrich**
 PA California Institute of Technology, USA
 SO PCT Int. Appl., 90 pp.
 CODEN: PIXXD2
 DT Patent
 LA English
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2001077368	A1	20011018	WO 2001-US11353	20010405
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG			
	US 2001055786	A1	20011227	US 2001-828599	20010405
	EP 1292699	A1	20030319	EP 2001-924807	20010405
	R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR			
PRAI	US 2000-194992P	P	20000405		
	WO 2001-US11353	W	20010405		
AB	The present invention relates to screening methods for oxidn. enzymes, particularly mono- and dioxygenases. According to the methods of the invention, a product of an oxidn. reaction is converted into a phenol or a catechol, which is easily detected by a Gibbs assay. This conversion allows for a sensitive and efficient assay. Both high-throughput liq.-phase and solid-phase methods using these principles are provided. Also described are methods for detecting phenolic ether-products and sulphydryl products from oxidn. reactions, also using a Gibbs assay. The oxidn. pathway for a generic, monosubstituted benzene being degraded by the toluene dioxygenase system is presented.				
IC	ICM	C12Q001-26			
	ICS	C12Q001-32; C12Q001-00			
CC	7-1 (Enzymes)				
ST	oxygenase detn screening evolution Gibbs assay				
IT	Glycols, uses				
	RL:	ARG (Analytical reagent use); ANST (Analytical study); USES (Uses) (cis-dihydro-; screening method for discovery and directed evolution of oxygenase using Gibbs assay)			
IT	Imaging	(digital; screening method for discovery and directed evolution of oxygenase using Gibbs assay)			
IT	Plasmids	(encoding test enzyme gene; screening method for discovery and directed evolution of oxygenase using Gibbs assay)			
IT	Membranes, nonbiological	(host cell immobilization on; screening method for discovery and directed evolution of oxygenase using Gibbs assay)			
IT	Evolution	(mol.; screening method for discovery and directed evolution of oxygenase using Gibbs assay)			
IT	Immobilization, biochemical	(of host cell; screening method for discovery and directed evolution of oxygenase using Gibbs assay)			

L4 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2003 ACS
RN 101-38-2 REGISTRY
CN 2,5-Cyclohexadien-1-one, 2,6-dichloro-4-(chloroimino)- (8CI, 9CI) (CA
INDEX NAME)
OTHER CA INDEX NAMES:
CN p-Benzoquinone imine, N,2,6-trichloro- (6CI, 7CI)
OTHER NAMES:
CN 2,6-Dichloro-4-chloroimino-2,5-cyclohexadien-1-one
CN 2,6-Dichloro-4-N-chloroquinonimine
CN 2,6-Dichloro-p-benzoquinone-4-chlorimide
CN 2,6-Dichlorobenzoquinone chloroimide
CN 2,6-Dichlorobenzoquinone N-chloroimine
CN 2,6-Dichlorobenzoquinone-4-chloroimine
CN 2,6-Dichloroquinone chlorimide
CN 2,6-Dichloroquinone chloroimide
CN 2,6-Dichloroquinone-4-chloroimide
CN 2,6-Dichloroquinone-4-chloroimine
CN 2,6-Dichloroquinonechloroimine
CN Gibbs' reagent
CN N,2,6-Trichloro-p-benzoquinoneimine
CN N,2,6-Trichloro-p-benzoquinonimine
CN N,2,6-Trichlorobenzoquinone imine
CN Named reagents and solutions, Gibbs'
FS 3D CONCORD
DR 64216-21-3
MF C₆ H₂ Cl₃ N O
CI COM
LC STN Files: AGRICOLA, BEILSTEIN*, BIOBUSINESS, BIOSIS, CA, CANCERLIT,
CAOLD, CAPLUS, CASREACT, CHEMCATS, CHEMINFORMRX, CHEMLIST, CSCHEM,
EMBASE, HODOC*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MRCK*, MSDS-OHS,
PIRA, RTECS*, SPECINFO, TOXCENTER, USPATFULL
(*File contains numerically searchable property data)
Other Sources: DSL**, EINECS**, TSCA**
(**Enter CHEMLIST File for up-to-date regulatory information)



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

204 REFERENCES IN FILE CA (1962 TO DATE)
4 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
204 REFERENCES IN FILE CAPLUS (1962 TO DATE)
25 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

IT Spectroscopy
(screening method for discovery and directed evolution of oxygenase using Gibbs assay)

IT Aromatic hydrocarbons, uses
Flavanols
Phenols, uses
RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(screening method for discovery and directed evolution of oxygenase using Gibbs assay)

IT 9007-43-6, Microperoxidase, biological studies
RL: ANT (Analyte); BSU (Biological study, unclassified); ANST (Analytical study); BIOL (Biological study)
(heme peptide; screening method for discovery and directed evolution of oxygenase using Gibbs assay)

IT 9002-18-0, Agar
RL: ARU (Analytical role, unclassified); ANST (Analytical study)
(host cell immobilization on; screening method for discovery and directed evolution of oxygenase using Gibbs assay)

IT 63774-46-9P, Toluene dihydrodiol dehydrogenase
RL: ANT (Analyte); ARG (Analytical reagent use); BPN (Biosynthetic preparation); BSU (Biological study, unclassified); ANST (Analytical study); BIOL (Biological study); PREP (Preparation); USES (Uses)
(screening method for discovery and directed evolution of oxygenase using Gibbs assay)

IT 9015-72-9, Dehalogenase
RL: ANT (Analyte); ARG (Analytical reagent use); BSU (Biological study, unclassified); ANST (Analytical study); BIOL (Biological study); USES (Uses)
(screening method for discovery and directed evolution of oxygenase using Gibbs assay)

IT 9035-51-2, cytochrome P 450, biological studies 9037-29-0, Oxygenase
9038-14-6, Monooxygenase 9055-20-3, Chloroperoxidase 9074-04-8,
Naphthalene dioxygenase 37256-84-1, Phenol hydroxylase 37292-90-3,
Dioxygenase 51961-97-8, Methane monooxygenase 103289-55-0, Biphenyl
dioxygenase 120038-36-0, Toluene dioxygenase
RL: ANT (Analyte); BSU (Biological study, unclassified); ANST (Analytical study); BIOL (Biological study)
(screening method for discovery and directed evolution of oxygenase using Gibbs assay)

IT 53-84-9, NAD 55-21-0, Benzamide 65-85-0, Benzoic acid, uses 71-43-2,
Benzene, uses 71-43-2D, Benzene, alkylated, halogenated, and
carboxylated derivs., uses 74-85-1D, Ethylene, halogenated derivs.
93-09-4, 2-Naphthoic acid 95-63-6, 1,2,4-Trimethylbenzene 98-06-6
100-09-4, p-Methoxybenzoic acid 101-38-2 108-86-1, Bromobenzene, uses
108-88-3, Toluene, uses 108-89-4, 4-Picoline 108-90-7, Chlorobenzene,
uses 108-95-2, Phenol, uses 110-86-1, Pyridine, uses 118-92-3,
Anthranilic acid 120-80-9, Catechol, uses 462-06-6, Fluorobenzene
591-50-4, Iodobenzene 7782-44-7, Oxygen, uses 14915-07-2, Peroxide
25506-13-2 37340-81-1, Anthranilate hydroxylase
RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(screening method for discovery and directed evolution of oxygenase using Gibbs assay)

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

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=> d his

(FILE 'HOME' ENTERED AT 09:50:22 ON 21 APR 2003)

FILE 'CA' ENTERED AT 09:50:45 ON 21 APR 2003
E SCHWANEBERG ULRICH/AU

L1 18 S E2 OR E3

FILE 'REGISTRY' ENTERED AT 09:59:11 ON 21 APR 2003

L2 1 S 2,6-DICHLORO-P-BENZOQUINONE/CN
L3 1 S GIBBS
L4 1 S GIBB? REAGENT

FILE 'CA' ENTERED AT 10:01:11 ON 21 APR 2003

L5 911565 S ANST/RL
S 101-38-2/REG#

FILE 'REGISTRY' ENTERED AT 10:01:48 ON 21 APR 2003

L6 1 S 101-38-2/RN

FILE 'CA' ENTERED AT 10:01:49 ON 21 APR 2003

L7 204 S L6
L8 96 S L7 AND L5
L9 240636 S CYTOCHROME OR ?OXYGENASE OR HYDROXYLASE OR ?PEROXIDASE
L10 3 S L9 AND L8
L11 117 S GIBBS? REAGENT
L12 94 S L11 NOT L7
L13 4041508 S ACIDIFICATION OR ACID
L14 127 S L13 AND (L11 OR L7)

FILE 'WPIDS' ENTERED AT 10:21:48 ON 21 APR 2003

L15 72 S GIBBS
L16 1 S 2,6-DICHLOROQUINONE-4-CHLOROIMIDE
L17 2501 S BENZOQUINONE
L18 2573 S L17 OR L16 OR L15
L19 909838 S ACIDIFICATION OR ACID OR PH
L20 1201 S L18 AND L19
L21 0 S ACIDFICATION
L22 2991 S ACIDIFICATION
L23 176596 S PH
L24 4 S L22 AND L18
L25 204 S L23 AND L18
L26 72 S L15

FILE 'USPATFULL' ENTERED AT 10:27:49 ON 21 APR 2003

L27 17 S GIBBS? REAGENT
L28 22 S 101-38-2/RN
L29 38 S L28 OR L27

FILE 'CA' ENTERED AT 10:38:51 ON 21 APR 2003

L30 2292 S DIHYDRODIOL
L31 251161 S PHENOL
L32 313 S L30 AND L31
L33 26545 S GIBBS?
S 101-38-2/REG#

FILE 'REGISTRY' ENTERED AT 10:39:41 ON 21 APR 2003

L34 1 S 101-38-2/RN

FILE 'CA' ENTERED AT 10:39:42 ON 21 APR 2003

L35 204 S L34
L36 26719 S L35 OR L33
L37 2 S L32 AND L36

L38 2 S L32 AND ACIDIFICATION
L39 1132287 S PH
L40 15 S L39 AND L32

FILE 'USPATFULL' ENTERED AT 10:44:12 ON 21 APR 2003

L41 143 S DIHYDRODIOL
L42 157326 S PHENOL
L43 92 S L41 AND L42
L44 92 S L41 (P) L43
L45 15 S L41 (P) L42
L46 1 S L41 AND L42 AND L27

=> log hold

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	10.65	301.03

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	0.00	-20.46

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